SEW EURODRIVE

Addendum to the Operating Instructions

MOVITRAC® LTX

Servo Module for MOVITRAC® LTP-B

Edition 09/2011

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1 Important Notes

1.1 Use of this documentation

The documentation is part of the product and contains important information about installation, startup, operation and service. The documentation is written for all employees who install, startup, and service this product.

The documentation must be accessible and legible. Make sure that persons responsible for the system and its operation, as well as persons who work independently on the unit, have read through the documentation carefully and understood it. If you are unclear about any of the information in this documentation, or if you require further information, contact SEW-EURODRIVE.

1.2 Structure of the safety notes

Unless the information in the documentation is adhered to, it will be impossible to ensure:

- Trouble-free operation
- Fulfillment of any rights to claim under guarantee

Consequently, read the operating instructions before you start working with the unit!

The operating instructions contain important information about servicing. Therefore, keep the operating instructions close to the unit.

1.2.1 Meaning of the signal words

The following table shows the grading and meaning of the signal words for safety notes, notes on potential risks of damage to property, and other notes.

Signal Word	Meaning	Consequences if disregarded
⚠ **DANGER**	Imminent danger	Severe or fatal injuries
⚠ **WARNING**	Possible dangerous situation	Severe or fatal injuries
⚠ **CAUTION**	Possible dangerous situation	Minor injuries
NOTICE	Possible damage to property	Damage to the drive system or its environment
INFORMATION	Useful information or tip: Simplifies the handling of the drive system.	

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1.2.2 Structure of the section safety notes

The section safety notes do not apply to a specific action, but to several actions pertaining to one subject. The pictograms used indicate either a general or a specific hazard.

This is the formal structure of a section safety note:

⚠ SIGNAL WORD

Nature and source of hazard.

Possible consequence(s) if disregarded.

- Measure(s) to prevent the hazard.

This is an example of a section safety note:

⚠ WARNING

Falling of suspended loads.

Severe or fatal injuries.

- Do not stand under the suspended load.
- Secure the danger zone.

1.2.3 Structure of the embedded safety notes

The embedded safety notes are directly integrated in the instructions just before the description of the dangerous action.

This is the formal structure of an embedded safety note:

- ⚠**SIGNAL WORD** Nature and source of hazard.

  Possible consequence(s) if disregarded.

  – Measure(s) to prevent the hazard.

This is an example of an embedded safety note:

- ⚠**DANGER** Risk of crushing if the drive restarts unintentionally.

  Severe or fatal injuries.

  – De-energize the drive.

  – Secure the drive against unintended restart.

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1.3 Rights to claim under limited warranty

A requirement of fault-free operation and fulfillment of any rights to claim under limited warranty is that you adhere to the information in the MOVITRAC® LTP-B documentation. Read the documentation before you start working with the unit!

Make sure that the documentation is available to persons responsible for the system and its operation as well as to persons who work independently on the unit. You must also ensure that the documentation is legible.

1.4 Exclusion of liability

You must comply with the information contained in this documentation to ensure safe operation and to achieve the specified product characteristics and performance features. SEW-EURODRIVE assumes no liability for injury to persons or damage to equipment or property resulting from non-observance of the documentation. In such cases, any liability for defects is excluded.

1.5 Copyright notice

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Unauthorized duplication, modification, distribution or any other use of the whole or any part of this documentation is strictly prohibited.

1.6 Other applicable documentation

This document supplements the MOVITRAC® LTP-B Operating Instructions. Only use this document in connection with the MOVITRAC® LTP-B Operating Instructions.

1.7 Product names and trademarks

The brands and product names contained within this publication are trademarks or registered trademarks of the titleholders.

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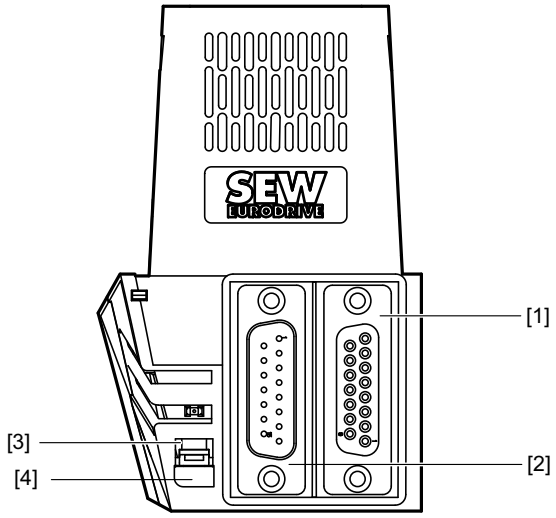
2 Unit Design

2.1 MOVITRAC® LTX

The following figure shows the MOVITRAC® LTX servo module:

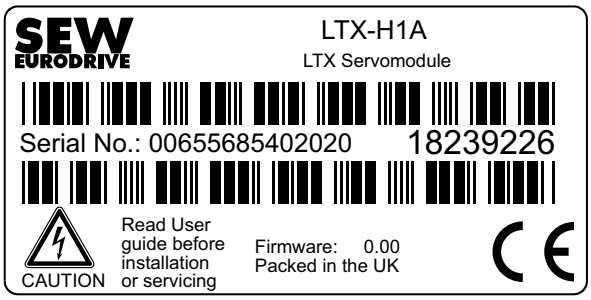


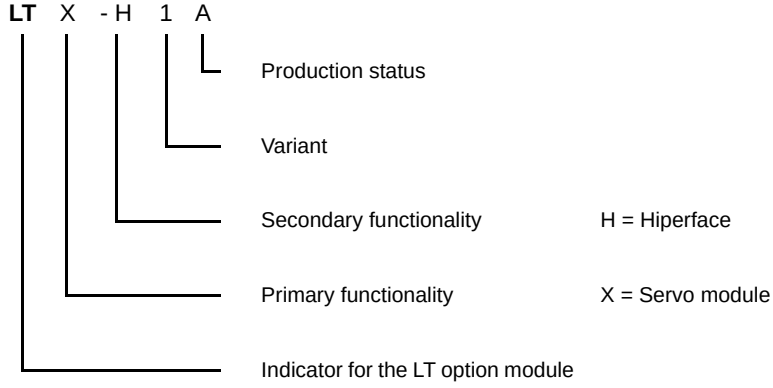
3575503499

[1] X14 Application connector
[2] X13 Motor feedback connector
[3] Detent nose
[4] Retaining button

2.2 Unit designation

2.2.1 Sample nameplate





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3 Mechanical Installation

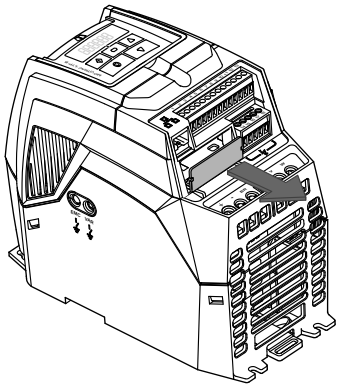
- **INFORMATION**

  Motor cables can only be connected when the MOVITRAC® LTX module is not plugged because some motor connections may be covered by the LTX module.

3.1 Installing MOVITRAC® LTX

To convert MOVITRAC® LTP-B into MOVITRAC® LTX, carry out the following steps:

1. Remove the protective cover from the LTX slot.



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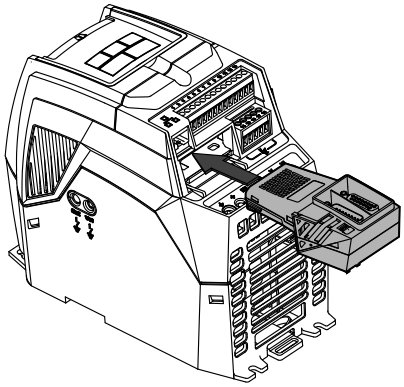
2. Carefully insert the LTX servo module into the slot. Make sure you insert the LTX module evenly to prevent the pins from being damaged.



3551073931

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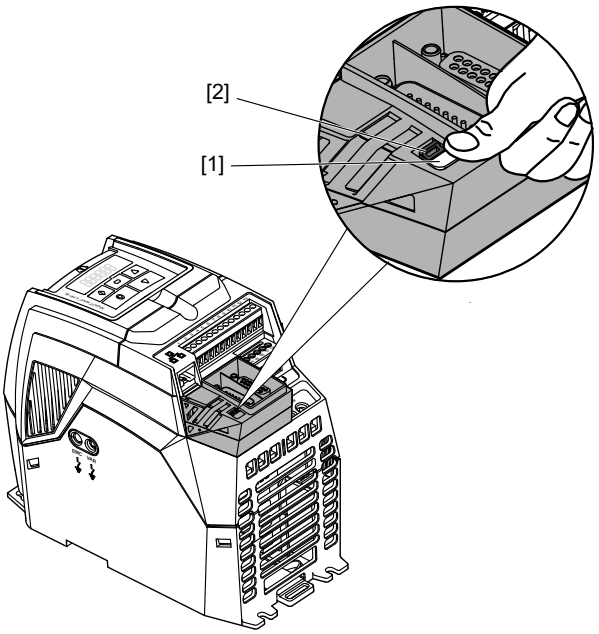
3. Secure the LTX servo module by pressing the retaining button [1].

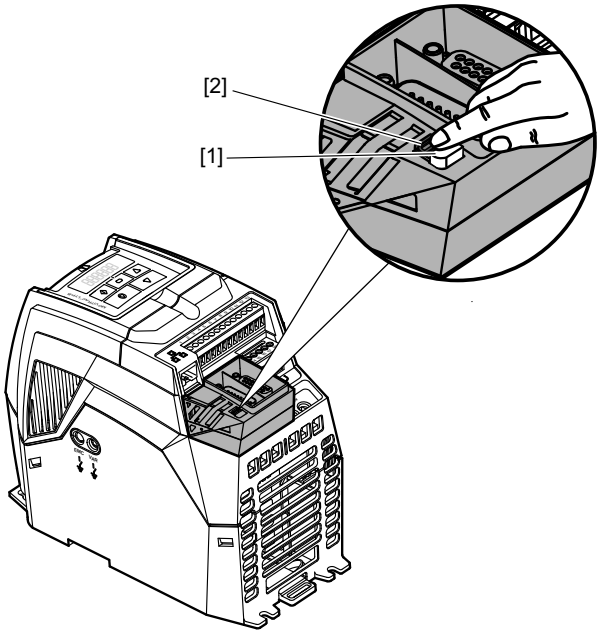


3579840267

[1] Retaining button
[2] Detent nose

3.2 Removing MOVITRAC® LTX

To unlock the LTX servo module, push the detent nose [2] in the direction of the slot to release the retaining button [1].



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4 Electrical Installation

This chapter illustrates the wiring of the following connections:

- Main terminals
- Relay terminals
- Motor encoder X13
- Application connection X14

The wiring of the main terminals and the application connection depends on the operating mode of the drive. The drive offers the following operating modes:

- Keypad mode
- Terminal mode
- External control mode
- SEW controller mode
- Operation via gateway

Proper functioning requires wiring according to the respective operating mode. The wiring options are therefore described in different sub-chapters.

We strongly recommend to perform a simple startup first as this chapter refers to the respective sub-chapter regarding the wiring according to the selected operating mode.

The connection X13 for the motor encoder and the relay terminals are wired in the same way for all operating modes. This is why the wiring is only described once for those two connections.

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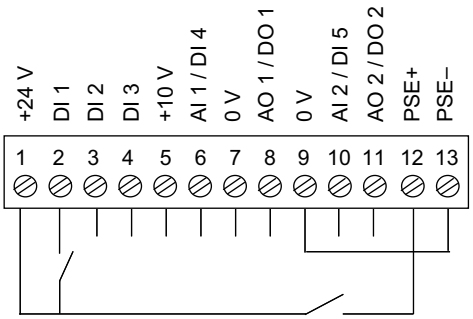
4.1 Overview of signal terminals for keypad mode

4.1.1 Main terminals

IP20 and IP55



3614563083

The signal terminal block is equipped with the following signal connections:

Terminal no.	Signal	Function ***P1-12* = 1** ***P1-15* = 1** **(pre-assigned)**	Description
1	+24 V	Output +24 V reference voltage	Ref. for the activation of DI1 – DI3 (max. 100 mA)
2	DI1	Enable	Positive logic "Logic 1" input voltage range: DC 8 – 30 V "Logic 0" input voltage range: DC 0 – 2 V Compatible with PLC requirement if 0 V is connected to terminal 7 or 9.
3	DI2	n.s.[1)]	
4	DI3	n.s. [1)]	
5	+10 V	n.s. [1)]	10 V ref. for analog input (Pot. supply +, 10 mA max., 1 kΩ min.)
6	AI1 / DI4	n.s. [1)]	0 – 10 V, 0 – 20 mA, 4 – 20 mA "Logic 1" input voltage range: DC 8 – 30 V
7	0 V	0 V reference potential	0 V reference potential (Pot. supply –)
8	AO1 / DO1	n.s. [1)]	0 – 10 V, 20 mA analog 24 V, 20 mA digital
9	0 V	0 V reference potential	0 V reference potential
10	AI2 / DI5	n.s. [1)]	0 – 10 V, 0 – 20 mA, 4 – 20 mA "Logic 1" input voltage range: DC 8 – 30 V
11	AO2 / DO2	n.s. [1)]	0 – 10 V, 20 mA analog 24 V, 20 mA digital
12	PSE +	Output stage enable	+24 V must be connected to PSE+
13	PSE–		GND must be connected to PSE–

1) Do not connect any cables

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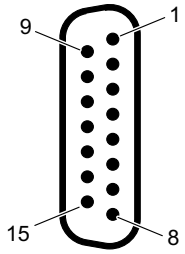
4.1.2 Application connection assignment X14

	Terminal no.	Signal	Function *P1-17* = 1 (pre-assigned)	Connector type
	**X14**			
	1[1)]	DI11	n.s.[2)]	D-sub 15-pole (male)
	2[1)]	DI12	n.s. [2)]	
	3[1)]	DI13	n.s. [2)]	
	4[1)]	DI14 / AI11	n.s. [2)]	
	5[1)]	PI1	n.s. [2)]	
	6[1)]	/PI1	n.s. [2)]	
	7[1)]	PI2	n.s. [2)]	
	8[1)]	/PI2	n.s. [2)]	
	9	A	n.s. [2)]	
	10	/A	n.s. [2)]	
	11	B	n.s. [2)]	
	12	/B	n.s. [2)]	
	13	Z	n.s. [2)]	
	14	/Z	n.s. [2)]	
	15		0 V	

1) Terminal assignment depends on parameter settings

2) Do not connect any cables

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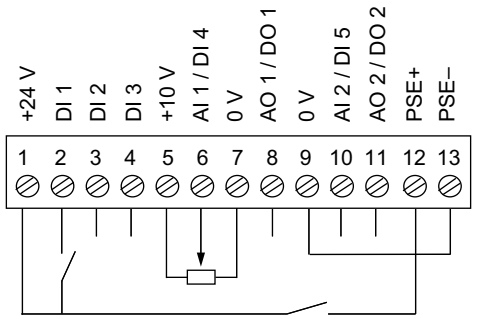
4.2 Overview of signal terminals for terminal mode (internal ramp control of the LTP without controller/gateway)

4.2.1 Main terminals

IP20 and IP55



3616350731

The signal terminal block is equipped with the following signal connections:

Terminal no.	Signal	Function ***P1-12* = 0** ***P1-15* = 1** **(pre-assigned)**	Description
1	+24 V	Output +24 V reference voltage	Ref. for the activation of DI1 – DI3 (max. 100 mA)
2	DI1	Enable	Positive logic "Logic 1" input voltage range: DC 8 – 30 V "Logic 0" input voltage range: DC 0 – 2 V Compatible with PLC requirement if 0 V is connected to terminal 7 or 9.
3	DI2	n.s.[1)]	
4	DI3	n.s. [1)]	
5	+10 V	Output +10 V reference voltage	10 V ref. for analog input (Pot. supply +, 10 mA max., 1 kΩ min.)
6	AI1 / DI4	Analog input (12 bit) reference speed	0 – 10 V, 0 – 20 mA, 4 – 20 mA "Logic 1" input voltage range: DC 8 – 30 V
7	0 V	0 V reference potential	0 V reference potential (Pot. supply –)
8	AO1 / DO1	n.s. [1)]	0 – 10 V, 20 mA analog 24 V, 20 mA digital
9	0 V	0 V reference potential	0 V reference potential
10	AI2 / DI5	n.s. [1)]	0 – 10 V, 0 – 20 mA, 4 – 20 mA "Logic 1" input voltage range: DC 8 – 30 V
11	AO2 / DO2	n.s. [1)]	0 – 10 V, 20 mA analog 24 V, 20 mA digital
12	PSE +	Output stage enable	+24 V must be connected to PSE+
13	PSE–		GND must be connected to PSE–

1) Do not connect any cables

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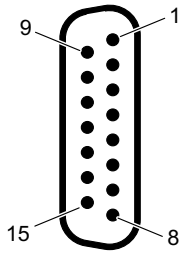
4.2.2 Application connection assignment X14

	Terminal no.	Signal	Function *P1-17* = 1 (pre-assigned)	Connector type
	**X14**			
	1[1)]	DI11	n.s.[2)]	D-sub 15-pole (male)
	2[1)]	DI12	n.s. [2)]	
	3[1)]	DI13	n.s. [2)]	
	4[1)]	DI14 / AI11	n.s. [2)]	
	5[1)]	PI1	n.s. [2)]	
	6[1)]	/PI1	n.s. [2)]	
	7[1)]	PI2	n.s. [2)]	
	8[1)]	/PI2	n.s. [2)]	
	9	A	n.s. [2)]	
	10	/A	n.s. [2)]	
	11	B	n.s. [2)]	
	12	/B	n.s. [2)]	
	13	Z	n.s. [2)]	
	14	/Z	n.s. [2)]	
	15		0 V	

1) Terminal assignment depends on parameter settings

2) Do not connect any cables

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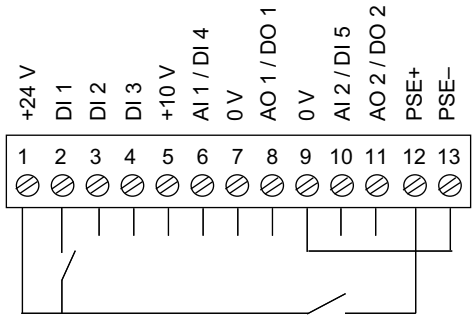
4.3 Overview of signal terminals for third-party controllers

4.3.1 Main terminals

IP20 and IP55



3614563083

The signal terminal block is equipped with the following signal connections:

Terminal no.	Signal	Function ***P1-12* = 0** ***P1-15* = 1** **(pre-assigned)**	Description
1	+24 V	Output +24 V reference voltage	Ref. for the activation of DI1 – DI3 (max. 100 mA)
2	DI1	Enable	Positive logic "Logic 1" input voltage range: DC 8 – 30 V "Logic 0" input voltage range: DC 0 – 2 V Compatible with PLC requirement if 0 V is connected to terminal 7 or 9.
3	DI2	n.s.[1)]	
4	DI3	n.s. [1)]	
5	+10 V	n.s. [1)]	10 V ref. for analog input (Pot. supply +, 10 mA max., 1 kΩ min.)
6	AI1 / DI4	n.s. [1)]	0 – 10 V, 0 – 20 mA, 4 – 20 mA "Logic 1" input voltage range: DC 8 – 30 V
7	0 V	0 V reference potential	0 V reference potential (Pot. supply –)
8	AO1 / DO1	n.s. [1)]	0 – 10 V, 20 mA analog 24 V, 20 mA digital
9	0 V	0 V reference potential	0 V reference potential
10	AI2 / DI5	n.s. [1)]	0 – 10 V, 0 – 20 mA, 4 – 20 mA "Logic 1" input voltage range: DC 8 – 30 V
11	AO2 / DO2	n.s. [1)]	0 – 10 V, 20 mA analog 24 V, 20 mA digital
12	PSE +	Output stage enable	+24 V must be connected to PSE+
13	PSE–		GND must be connected to PSE–

1) Do not connect any cables

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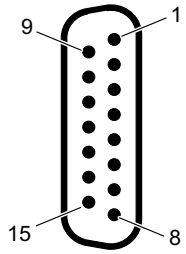
4.3.2 Application connection assignment X14

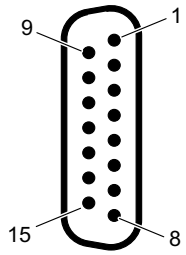
±10 V reference potential and encoder simulation



	Terminal no.	Signal	Function *P1-17* = 5	Function *P1-17* = 6	Connector type
	X14				
	1[1)]	DI11	–	Limit switch left	D-sub 15-pole (male)
	2[1)]	DI12	–	Limit switch right	
	3[1)]	DI13	Fast reference cam for referencing input		
	4[1)]	DI14 / AI11	Fast + – 10 V reference speed signal input		
	5[1)]	PI1	–		
	6[1)]	/PI1	–		
	7[1)]	PI2	–		
	8[1)]	/PI2	–		
	9	A	Encoder simulation output A		
	10	/A	Encoder simulation output /A		
	11	B	Encoder simulation output B		
	12	/B	Encoder simulation output /B		
	13	Z	Encoder simulation Z		
	14	/Z	Encoder simulation /Z		
	15		0 V		

1) Terminal assignment depends on parameter settings

Interface pulse / direction or A/B phase



	Terminal	Signal	Function *P1-17* = 5	Function *P1-17* = 6	Connector type
	X14				
	1[1)]	DI11	–		D-sub 15-pole (male)
	2[1)]	DI12	–		
	3[1)]	DI13	–		
	4[1)]	DI14 / AI11	–		
	5[1)]	PI1	Input pulse	Input A phase	
	6[1)]	/PI1	Input \pulse	Input \A phase	
	7[1)]	PI2	Input direction	Input B phase	
	8[1)]	/PI2	Input \direction	Input \B phase	
	9	A	n.s.[2)]		
	10	/A	n.s. [2)]		
	11	B	n.s. [2)]		
	12	/B	n.s. [2)]		
	13	Z	n.s. [2)]		
	14	/Z	n.s. [2)]		
	15		0 V		

1) Terminal assignment depends on parameter settings. Input is RS422-compliant and not HTL-capable (connection of 24 V signals not possible). Maximum voltage of –10 to 15 V between PI1, /PI1, PI2, /PI2 and 0 V. Nominal operation level DC ± 6 V differential and min. DC ± 2 V differential.

2) Do not connect any cables

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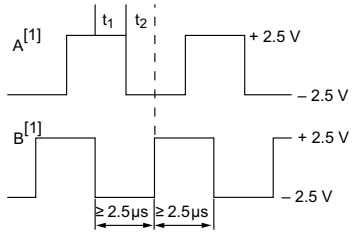
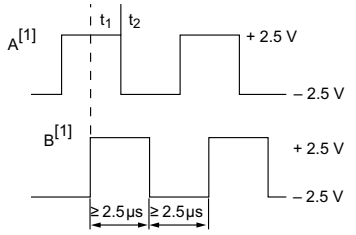
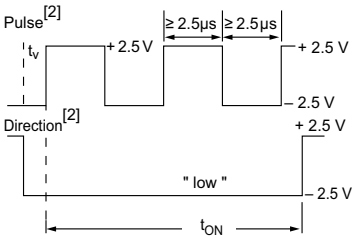
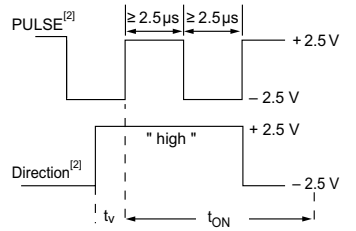
The following illustration shows the motor behavior according to the setting of parameter *P1-17* and the signal sequence.

P1-17	Negative direction (CCW)	Positive direction (CW)
Input A/B phase *P1-17* = 8		
Input pulse/direction *P1-17* = 7		

[1] The displayed signals A or B are the resulting signals/voltage values between A (PI1) and /A (/PI1) or B (PI2) and /B (/PI2).

[2] The displayed signals pulse and direction are the resulting signals/voltage values between pulse (PI1) and /pulse (/PI1) or direction (PI2) and /direction (/PI2).

t_1, t_2 $t_1 / t_2 \geq 1.25 \pm 10\ \%$

t_v $t_v \geq 0.5\ \mu s$

t_{ON} $t_{ON} \geq 100\ \mu s$

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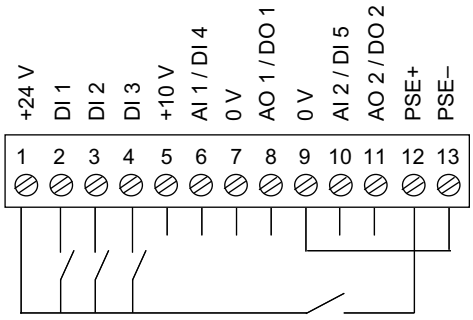
4.4 Overview of signal terminals for SEW controllers

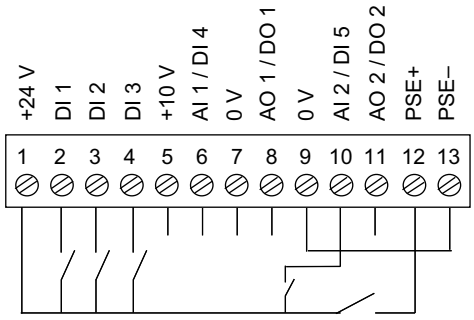
4.4.1 Main terminals

IP20 and IP55 profile 1



3616834059

IP55 and IP66 profile 2



3616835979

The signal terminal block is equipped with the following signal connections:

Terminal no.	Signal	Function Profile 1	Function Profile 2	Description
		***P1-12* = set automatically** **P1-15 = set automatically**		
1	+24 V	Output +24 V reference voltage	Output +24 V reference voltage	Ref. for the activation of DI1 – DI3 (max. 100 mA)
2	DI1	Start	Start	Positive logic "Logic 1" input voltage range: DC 8 – 30 V "Logic 0" input voltage range: DC 0 – 2 V Compatible with PLC requirement if 0 V is connected to terminal 7 or 9.
3	DI2	Reset	Reset	
4	DI3	Reference cam	Reference cam	
5	+10 V	n.s.[1)]	n.s. [1)]	10 V ref. for analog input (Pot. supply +, 10 mA max., 1 kΩ min.)
6	AI1 / DI4	n.s. [1)]	Limit switch +	0 – 10 V, 0 – 20 mA, 4 – 20 mA "Logic 1" input voltage range: DC 8 – 30 V
7	0 V	0 V reference potential	0 V reference potential	0 V reference potential (Pot. supply –)
8	AO1 / DO1	n.s. [1)]	n.s. [1)]	0 – 10 V, 20 mA analog 24 V, 20 mA digital
9	0 V	0 V reference potential	0 V reference potential	0 V reference potential
10	AI2 / DI5	n.s. [1)]	Limit switch –	0 – 10 V, 0 – 20 mA, 4 – 20 mA "Logic 1" input voltage range: DC 8 – 30 V
11	AO2 / DO2	n.s. [1)]	n.s. [1)]	0 – 10 V, 20 mA analog 24 V, 20 mA digital
12	PSE +	Output stage enable	Output stage enable	+24 V must be connected to PSE+
13	PSE–			GND must be connected to PSE–

1) Do not connect any cables

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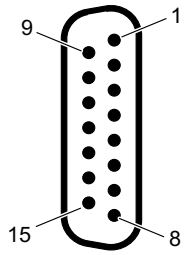
4.4.2 Application connection assignment X14

	Terminal no.	Signal	Function *P1-17* = 1 (pre-assigned)	Connector type
	**X14**			
	1[1)]	DI11	n.s.[2)]	D-sub 15-pole (male)
	2[1)]	DI12	n.s. [2)]	
	3[1)]	DI13	Touch probe 1	
	4[1)]	DI14 / AI11	Touch probe 2	
	5[1)]	PI1	n.s. [2)]	
	6[1)]	/PI1	n.s. [2)]	
	7[1)]	PI2	n.s. [2)]	
	8[1)]	/PI2	n.s. [2)]	
	9	A	n.s. [2)]	
	10	/A	n.s. [2)]	
	11	B	n.s. [2)]	
	12	/B	n.s. [2)]	
	13	Z	n.s. [2)]	
	14	/Z	n.s. [2)]	
	15		0 V	

1) Terminal assignment depends on parameter settings

2) Do not connect any cables

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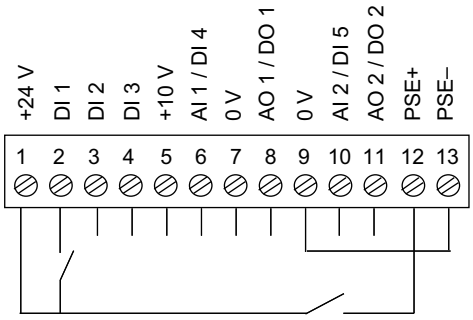
4.5 Overview of signal terminals for SEW gateways

4.5.1 Main terminals

IP20 and IP55



3614563083

The signal terminal block is equipped with the following signal connections:

Terminal no.	Signal	Function ***P1-12* = 0** ***P1-15* = 1** **(pre-assigned)**	Description
1	+24 V	Output +24 V reference voltage	Ref. for the activation of DI1 – DI3 (max. 100 mA)
2	DI1	Enable	Positive logic "Logic 1" input voltage range: DC 8 – 30 V "Logic 0" input voltage range: DC 0 – 2 V Compatible with PLC requirement if 0 V is connected to terminal 7 or 9.
3	DI2	n.s.[1)]	
4	DI3	n.s. [1)]	
5	+10 V	n.s. [1)]	10 V ref. for analog input (Pot. supply +, 10 mA max., 1 kΩ min.)
6	AI1 / DI4	n.s. [1)]	0 – 10 V, 0 – 20 mA, 4 – 20 mA "Logic 1" input voltage range: DC 8 – 30 V
7	0 V	0 V reference potential	0 V reference potential (Pot. supply –)
8	AO1 / DO1	n.s. [1)]	0 – 10 V, 20 mA analog 24 V, 20 mA digital
9	0 V	0 V reference potential	0 V reference potential
10	AI2 / DI5	n.s. [1)]	0 – 10 V, 0 – 20 mA, 4 – 20 mA "Logic 1" input voltage range: DC 8 – 30 V
11	AO2 / DO2	n.s. [1)]	0 – 10 V, 20 mA analog 24 V, 20 mA digital
12	PSE +	Output stage enable	+24 V must be connected to PSE+
13	PSE–		GND must be connected to PSE–

1) Do not connect any cables

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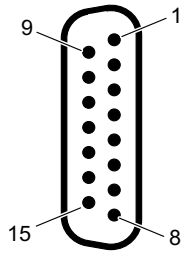
4.5.2 Application connection assignment X14

	Terminal no.	Signal	Function	Connector type
	X14			
	1[1)]	DI11	n.s.[2)]	D-sub 15-pole (male)
	2[1)]	DI12	n.s. [2)]	
	3[1)]	DI13	n.s. [2)]	
	4[1)]	DI14 / AI11	n.s. [2)]	
	5[1)]	PI1	n.s. [2)]	
	6[1)]	/PI1	n.s. [2)]	
	7[1)]	PI2	n.s. [2)]	
	8[1)]	/PI2	n.s. [2)]	
	9	A	n.s. [2)]	
	10	/A	n.s. [2)]	
	11	B	n.s. [2)]	
	12	/B	n.s. [2)]	
	13	Z	n.s. [2)]	
	14	/Z	n.s. [2)]	
	15		0 V	

1) Terminal assignment depends on parameter settings

2) Do not connect any cables

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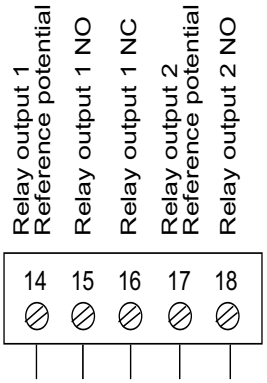
4.6 Overview of relay terminals and X13

4.6.1 Relay terminal overview for all operating modes



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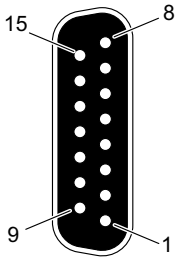
Terminal no.	Signal	Description
14	Relay output 1 reference	Relay contact (AC 250 V / DC 30 V @ 5 A)
15	Relay output 1 NO	
16	Relay output 1 NC	
17	Relay output 2 reference	
18	Relay output 2 NO	

4.6.2 Connection assignment X13 motor encoder for all operating modes



Terminal no.	Function	Connector type
	X13	
1	Signal track A (cos+)	D-sub 15-pole (female)
2	Signal track B (sin+)	
3	n.s.[1)]	
4	DATA+	
5	n.s.	
6	KTY–	
7	n.s. [1)]	
8	DGND	
9	Signal track A_N (cos–)	
10	Signal track B_N (sin–)	
11	n.s. [1)]	
12	DATA–	
13	n.s.	
14	KTY +	
15	Us	

1) Do not connect any cables

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5 Startup

5.1 User interface

5.1.1 Keypad

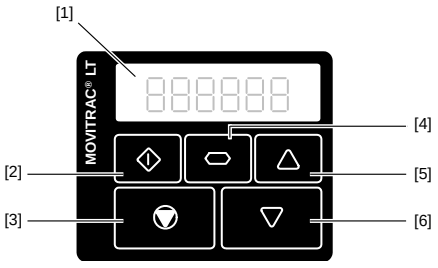
Each MOVITRAC® LTP-B is equipped with a keypad as standard that allows for operating and setting-up the drive without any further devices.

The keypad has 5 keys with the following functions:

Start (execute)	• Enables the motor • Reverses the direction of rotation if bidirectional keypad mode is activated
Stop/reset	• Stops the motor • Acknowledges an error
Navigate	• Shows real-time information • Press and hold to enable/disable parameter edit mode • Saves parameter changes
Up	• Increases the speed in real-time mode • Increases the parameter values in parameter edit mode
Down	• Decreases the speed in real-time mode • Decreases the parameter values in parameter edit mode

If the parameters are set to the factory settings, the "Start" and "Stop" keys of the keypad are disabled. In order to enable the "Start" and "Stop" keys of the keypad, *P1-12* must be set to 1 or 2, see operating instructions for MOVITRAC® LTP-B, chapter "Parameter group 1: Standard parameters".

The parameter edit menu can only be accessed via the "Navigate" key. Press and hold the key (> 1 s) to switch between the parameter edit menu and the real-time display (operating state of the drive/speed). Press this key briefly (< 1 s) to switch between the operating speed and operating current of the running drive.



2933664395

[1]	Display	[4]	Navigate
[2]	Start	[5]	Up
[3]	Stop/reset	[6]	Down

- **NOTE**

  To restore the factory settings, press the "Up", "Down" and "Stop/reset" keys simultaneously for > 2 s. "P-deF" is displayed.

  Press the "Stop/reset" key again to confirm the change and to reset the inverter.

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Extended key combinations

Function	The device displays...	Press...	Result	Example
Quick parameter group selection[1)]	Px-xx	"Navigate" + "Up" keys	The next higher parameter group is selected	• "P1-10" is displayed • Press the "Navigate" + "Up" keys • Now, "P2-01" is displayed
	Px-xx	"Navigate" + "Down" keys	The next lower parameter group is selected	• "P2-26" is displayed • Press the "Navigate" + "Down" keys • Now, "P1-01" is displayed
Selection of the lowest group parameter	Px-xx	"Up" + "Down" keys	The first parameter of a group is selected	• "P1-10" is displayed • Press the "Up" + "Down" keys • Now, "P1-01" is displayed
Set the parameter to the lowest value	Numerical value (when changing a parameter value)	"Up" + "Down" keys	The parameter is set to the lowest value	When changing P1-01: • "50.0" is displayed • Press the "Up" + "Down" keys • Now "0.0" is displayed
Changing individual digits of a parameter value	Numerical value (when changing a parameter value)	"Stop/reset" + "Navigate" keys	The individual parameter digits can be changed	When setting *P1-10*: • "0" is displayed • Press the "Stop/reset" + "Navigate" keys • Now "_0" is displayed • Press the "Up" key • Now "10" is displayed • Press the "Stop/reset" + "Navigate" keys • Now "_10" is displayed • Press the "Up" key • Now "110" is displayed etc.

1) Parameter group access must be activated by setting *P1-14* to "101".

5.1.2 Display

A six-digit 7-segment display is integrated in each drive. It can be used to monitor drive functions and set parameters.

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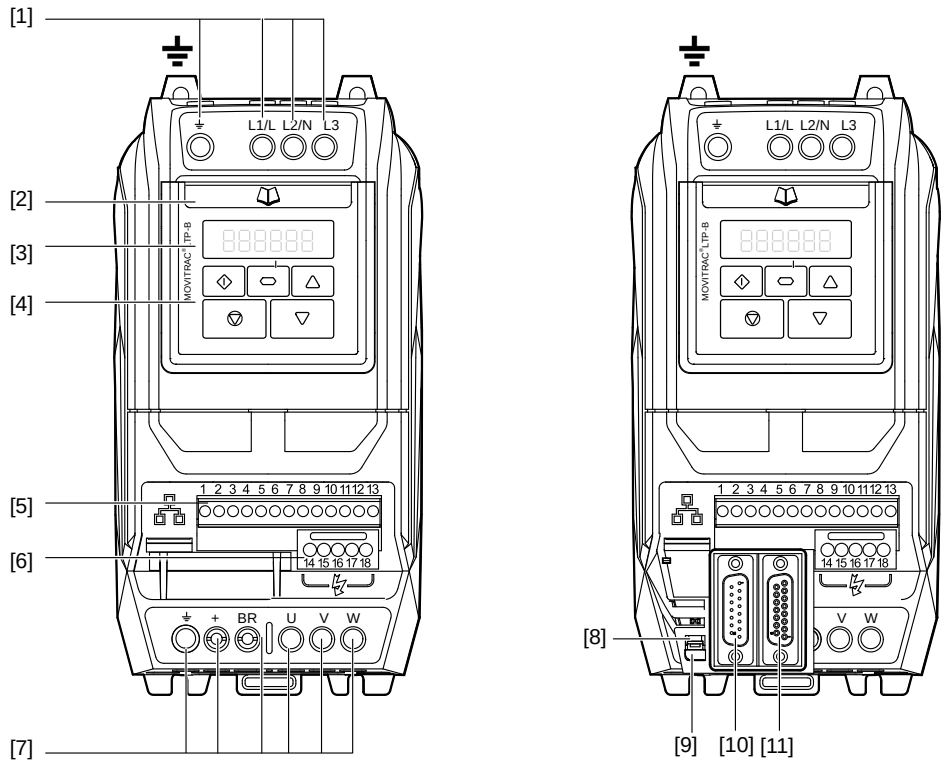
5.2 Simple startup of MOVITRAC® LTX

The following figure shows the MOVITRAC® LTP-B without and with inserted LTX servo module.



[1] Supply system terminals
[2] Quick aid
[3] Display
[4] Keypad
[5] Main terminals
[6] Relay terminals
[7] Connection for motor and brake chopper
[8] Detent
[9] Push button
[10] X14 application connection
[11] X13 Motor encoder connection

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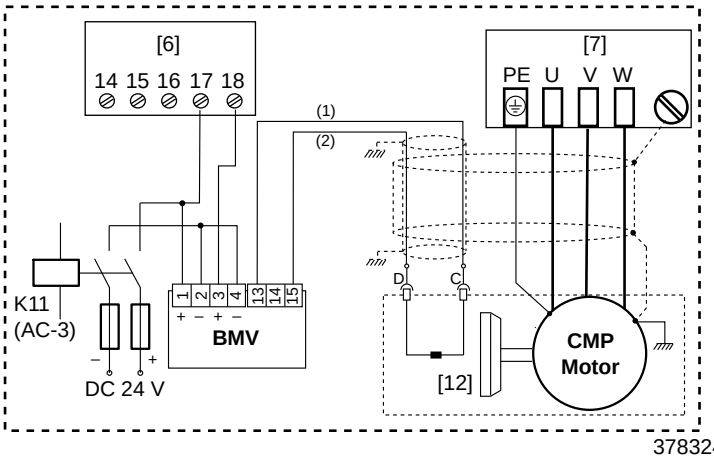
5.2.1 Basic wiring and settings prior to operating mode-specific startup

- Connect the CMP motor with a pre-fabricated SEW motor cable to the motor connection terminals [7].
- If you want to connect a CMP brakemotor, use a pre-fabricated SEW brakemotor cable and a BMV brake rectifier. The brake must be wired according to the following wiring diagram.



[6] Relay terminals
[7] Connection for motor and brake chopper
[12] Optionally integrated motor brake

- Connect the motor encoder to the motor encoder connection X13 [11] of the LTX device with a pre-fabricated SEW encoder cable.
- ⚠ **WARNING** Danger due to unintended restart.

  The motor might restart when the inverter is connected to the supply.

  – Regardless of the selected operating mode, the contacts 12 and 13 of the main terminals [5] must be interrupted.
- Connect the inverter to the supply system by wiring the supply terminals [1].
- Turn on the inverter.
- Restore the factory settings of the inverter, if required (press the "Stop", "Up" and "Down" keys for 5 s until "P-Def" is displayed). Confirm with the "Stop" key.
- Check whether the correct CMP motor is displayed in the parameter *P1-16*.
- If *P1-16* = "in-syn", or if there is no access, the motor encoder does not have a valid electronic nameplate. Without valid electronic nameplate, the motor type must be set manually.

  Setting the motor type manually:

  - Set *P1-14* to "1" for free access to parameters *P1-16* to *P1-22*
  - Set *P1-16* to the connected motor type.
  - Set *P1-18* to "1" to activate the thermal motor protection KTY.
  - **INFORMATION**

    Only motors of the Smart Servo Package are supported.

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- Once the correct motor has been set, either automatically or manually, the motor startup is completed.
- The motor overload protection is set to "250%" to provide a high overload torque.
- If you use an SEW encoder cable, the KTY thermistor is connected by default in order to provide for thermal motor protection.
- Contacts 12 and 13 of the main terminals [5] are wired according to the selected operating mode. Now you can enable the drive. For information on the electrical installation depending on the respective operating mode refer to chapter "Electrical Installation" (page 11) or to the following chapters that illustrate the correct wiring according to the operating mode.
  - "Keypad mode (*P1-12* = 1 or 2)" (page 29)
  - "Terminal mode (basic setting) *P1-12* = 0 fur LTP-internal ramp control" (page 29)
  - "Linking and startup with different controllers (third-party controller and SEW controller)" (page 30)
- ⚠ **WARNING** Danger of electric shock.

  Improper wiring my cause danger due high voltages when the motor or the drive is enabled.
  - Check the wiring according to:
    - the selected operating mode
    - the installation and wiring notes in chapter "Electrical Installation"
    - the installation and wiring notes in chapter "Electrical Installation" in the "MOVITRAC® LTP-B" operating modes.
- **INFORMATION**

  All motors of the Smart Servo Package can be operated with standard parameter settings of the inverter for speed and position control. You can change parameter *P1-22* for initial simple control loop optimization. Parameter *P1-22* represents the relation between total inertia ($J_{ext} = J_{Load} + J_{Gear\ unit}$) and motor inertia ($J_{mot}$ / Jb_{mot}).

$$P1-22 = \frac{J_{ext}}{J_{mot}}$$

  For further optimization options regarding speed and position control, refer to chapter "Control loop optimization in different operating modes" (page 38).

  For further information regarding the motor inertia, refer to chapter "Mass moment of inertia of the CMP motors in the Smart Servo Package" (page 56).

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5.2.2 Keypad mode (P1-12 = 1 or 2)

For operation in keypad mode:

- As the electrical installation depends on the respective operating mode, chapter "Overview of signal terminals for keypad mode" (page 12) provides wiring information.
- Set *P1-12* to "1" (uni-directional) or "2" (bi-directional).
- Connect a wire break or a switch between terminal 1 and 2 to the user terminal block in order to enable the drive.
- Press the "Start" key. The drive is enabled with 0.0 Hz.
- Press the "Up" key to increase the speed or the "Down" key to decrease the speed.
- To stop the drive, press the "Stop/reset" key.
- Press the "Start" key again to resume the original speed.

  If bi-directional mode is enabled (*P1-12* = 2), the direction is reversed by pressing the "Start" key.

- **INFORMATION**

  The required target speed can be set by pressing the "Stop/reset" key in standstill. By then pressing the "Start" key, the drive moves along a ramp until it has reached this speed.

5.2.3 Terminal mode (basic setting) P1-12 = 0 fur LTP-internal ramp control

For operation in keypad mode (basic setting):

- As the electrical installation depends on the respective operating mode, chapter "Overview of signal terminals for terminal mode" (page 14) provides wiring information.
- *P1-12* must be set to "0" (basic setting).
- Connect a switch between terminals 1 and 2 on the user terminal block.
- Connect a potentiometer (1 – 10 k) between terminals 5, 6 and 7, the sliding contact is connected to pin 6.
- Provide for a connection between terminals 1 and 2 in order to enable the drive.
- Set the speed using the potentiometer.

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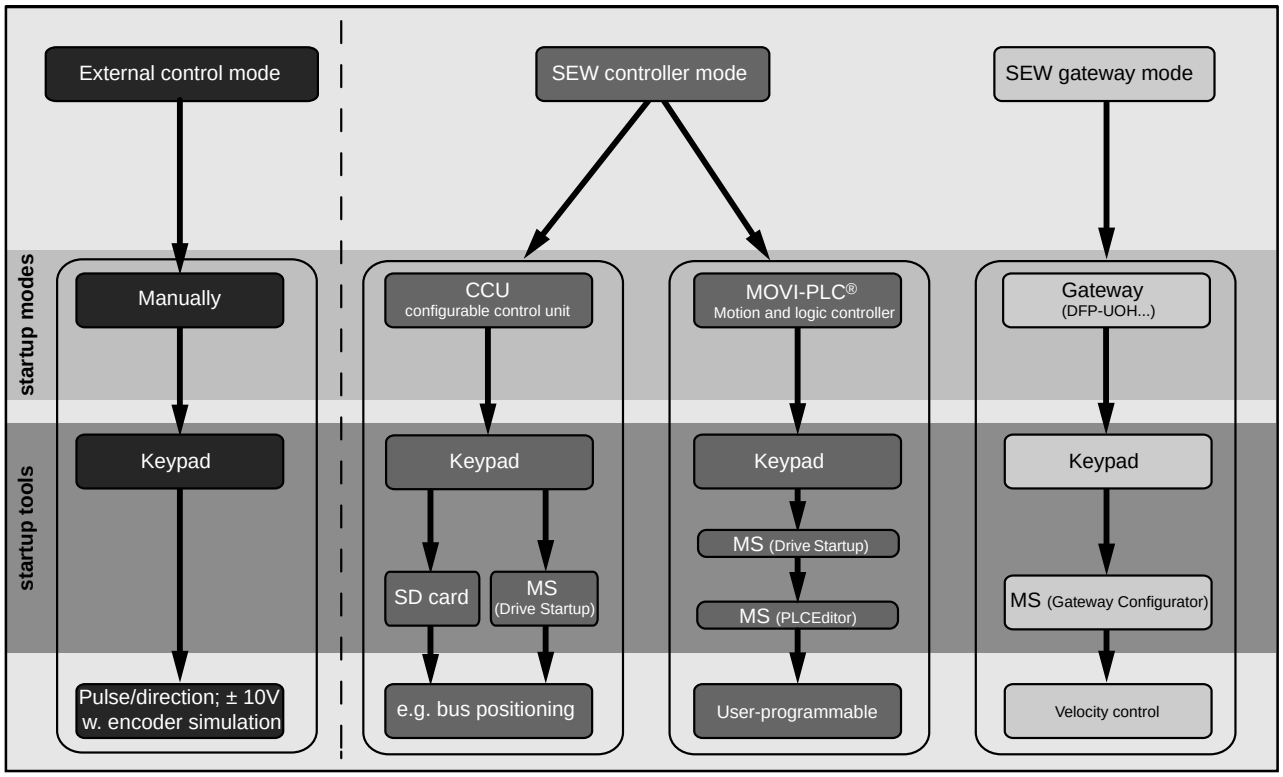
5.2.4 Linking and startup with different controllers (third-party controller and SEW controller)



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Third-party controllers, SEW controllers and gateway operation are described in the following chapters.

Third-party controller mode

For operation in third-party controller mode:

Setting motor limits (applies to all third-party controller modes):

- Set parameter *P1-01* to the upper limit of the required motor speed (N_{max} [rpm]). If the values are displayed in Hz, set the rated speed of the motor in *P1-10* to the rated speed of the connected motor. *P1-01* also represents the possible maximum speed in analog mode with ± 10 V, if DC 10 V are connected. (For all Smart Servo Package motors, *P1-10* should show 4500 rpm). For a detailed description of this parameter, refer to the MOVITRAC® LTP-B operating instructions.
- Set *P1-03* to the required acceleration ramp that specifies the time in seconds, the output frequency increases from 0 to 50 Hz (AccRamp [s]). The 6-pole CMP motors of the Smart Servo Package require an output frequency of 150 Hz for a speed of 3000 rpm, for example. You have to set *P1-03* to 0.33 s to specify an acceleration ramp of 3000 rpm/s. For a detailed description of this parameter, refer to the MOVITRAC® LTP-B operating instructions.
- Set *P1-04* to the required deceleration/stop ramp that specifies the time in seconds, the output frequency decreases from 50 to 0 Hz (DecRamp [s]). Proceed as with *P1-03*.

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Operation with ±10 V interface with analog input on the main terminal strip (sampling cycle = 16 ms)

- Set *P1-14* to 201 to access the parameters of the LTX-specific parameter group 8.
- Set *P1-15* to one of the possible operating modes: 22, 23, 24 or 25.

  For a detailed description of this parameter, refer to chapter "1-15 function selection digital inputs, LTX-specific parameters" (page 44). You can use an analog setpoint for velocity specification at the first analog input of the main terminal strip.
- Set *P1-12* to 0 (terminal control, default setting).
- If using the analog input, set *P2-30* to –10 to +10 V for bipolar voltage input at the analog input. For a detailed description of this parameter, refer to the MOVITRAC® LTP-B operating instructions.
- Use parameter *P8-01* to set the scaling factor for the incremental encoder simulation.

  For a detailed description of this parameter, refer to chapter "P8-01 simulated encoder scaling" (page 49)
- ⚠ **CAUTION** unexpected drive response possible.

  Risk of crushing

  If functions (e.g. the analog input) are set in parameter *P1-15* and activated in parameter *P1-17*, the input on the X14 connector has priority and the signal assignments on parameter *P1-15* are overwritten or deactivated.

  The wrong use of parameters *P1-15* and P1-17 in conjunction with the inputs of the terminals of X14 can cause uncontrolled movements or malfunctions of the drive.

  The required electric installation of the signal terminals depends on the selected operating mode. A wiring that does not suit the respective operating mode, can cause uncontrolled movements or malfunctions of the drive.

  – Wire the signal terminals according to chapter "Overview of signal terminals for third-party controllers" (page 16) and/or check the existing wiring accordingly.

  – Perform the parameterization of *P1-15* and P1-17 according to the operating mode.

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Operation with ±10 V interface with fast analog input on the LTX servo module (sampling cycle = 4 ms)

You should use the servo module inputs predominantly if you require reference cams or a fast analog input or a stepper motor control. This will also enable the pulse/direction control or the encoder input function.

- Set *P1-14* to 201 to access the parameters of the LTX-specific parameter group 8.
- Set *P1-15* to one of the possible operating modes: 22, 23, 24 or 25.

  For a detailed description of this parameter, refer to chapter "1-15 function selection digital inputs, LTX-specific parameters" (page 44).
- Set *P1-12* to 0 (terminal control, default setting).
- Set *P1-17* to one of the possible operating modes: 5 or 6.

  For a detailed description of the parameter, refer to chapter "P1-17 Smart Servo operation" (page 47).
- If using the analog input, set *P2-30* to –10 to +10 V for bipolar voltage input at the analog input.

  For a detailed description of this parameter, refer to the MOVITRAC® LTP-B operating instructions.
- Use parameter *P8-01* to set the scaling factor for the encoder simulation.

  For a detailed description of this parameter, refer to chapter "P8-01 simulated encoder scaling" (page 49)
- ⚠ **CAUTION** unexpected drive response possible.

  Risk of crushing

  If functions (e.g. the analog input) are set in parameter *P1-15* and activated in parameter *P1-17*, the input on the X14 connector has priority and the signal assignments on parameter *P1-15* are overwritten or deactivated.

  The wrong use of parameters *P1-15* and P1-17 in conjunction with the inputs of the terminals of X14 can cause uncontrolled movements or malfunctions of the drive.

  The required electric installation of the signal terminals depends on the selected operating mode. A wiring that does not suit the respective operating mode, can cause uncontrolled movements or malfunctions of the drive.

  – Wire the signal terminals according to chapter "Overview of signal terminals for third-party controllers" (page 16) and/or check the existing wiring accordingly.
  – Perform the parameterization of *P1-15* and P1-17 according to the operating mode.

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Operation with pulse/direction or A, /A, B, /B (stepper motor control interface) on the server module

- ⚠ **CAUTION** potential unexpected movement of the motor.

  Risk of crushing

  – Perform a reference travel prior to enabling the drive with stepper motor control (*P4-01* = 5, PM-Motor, position control). This is to align actual position and setpoint position. Without reference travel, the motor might move unexpectedly directly after it has been enabled.

  – We recommend to consult SEW-EURODRIVE before you activate jog mode in the current unit variant as jog mode causes a lag error that has to be processed by the position controller once the "jog signal" has been removed. This may cause unexpected movements.

    If jog mode is used, reset or deactivate the lag error and/or the lag error monitoring prior to an initial enable.

The servo module inputs are used predominantly if you require reference cams or a fast analog input or a stepper motor control. This will also enable the pulse/direction control or the encoder input function.

- Set *P1-14* to 201 to access the parameters of the LTX-specific parameter group 8.
- Set *P1-15* to one of the possible operating modes: 22, 23, 24 or 25.

  For a detailed description of this parameter, refer to chapter "1-15 function selection digital inputs, LTX-specific parameters" (page 44).
- Set *P1-12* to 0 (terminal control, default setting).
- Use parameter *P8-02* to set the scaling factor for the input pulses that represent a motor revolution.

  For a detailed description of this parameter, refer to chapter "P8-02 pulses per revolution for input pulse/direction A/B phase" (page 49).
- Set *P4-01* to 5 (PM Motor, position control).
- Set *P1-17* to one of the possible operating modes: 7 or 8.

  For a detailed description of the parameter, refer to chapter "P1-17 Smart Servo operation" (page 47).

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- ⚠ **CAUTION** unexpected drive response possible.

  Risk of crushing

  If functions (e.g. the analog input) are set in parameter *P1-15* and activated in parameter *P1-17*, the input on the X14 connector has priority and the signal assignments on parameter *P1-15* are overwritten or deactivated.

  The wrong use of parameters *P1-15* and P1-17 in conjunction with the inputs of the terminals of X14 can cause uncontrolled movements or malfunctions of the drive.

  The required electric installation of the signal terminals depends on the selected operating mode. A wiring that does not suit the respective operating mode can cause uncontrolled movements or malfunctions of the drive.

  – Wire the signal terminals according to chapter "Overview of signal terminals for third-party controllers" (page 16) and/or check the existing wiring accordingly.

  – Perform the parameterization of *P1-15* and P1-17 according to the operating mode.

- ⚠ **WARNING** Danger of electric shock.

  Improper wiring my cause danger due high voltages when the motor or the drive is enabled.

  – Check the wiring according to:
    - the selected operating mode
    - the installation and wiring notes in chapter "Electrical Installation"
    - the installation and wiring notes in chapter "Electrical Installation" in the "MOVITRAC® LTP-B" operating modes.

- **INFORMATION**

  For further information on the drive adaption, refer to chapter "Control loop optimization for gateway mode" (page 42).

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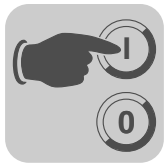

SEW control mode

For operation with an SEW controller with CCU or MOVI-PLC® (setup via the "Drive startup" wizard):

- Set the required drive address in *P1-19* (1 – 63).
- Set the required baud rate in *P1-20* (125, 250, 500, 1000 kBaud). For CCU mode, the baud rate must be set to 500 kBaud.
- For a detailed description of these two parameters, refer to the MOVITRAC® LTP-B operating instructions.
- The network view of MOVITOOLS® MotionStudio shows the LTX inverters in conjunction with the SEW controller. Click right to open the context menu and select "DriveStartUpLTX". Perform a network scan with MOVITOOLS® MotionStudio.
- Follow the instructions and perform all the required settings in the "Drive startup" software in MOVITOOLS® MotionStudio.
- **CAUTION** As the electrical installation depends on the respective operating mode, chapter "Overview of signal terminals for SEW controllers" (page 19) provides wiring information.
- ⚠ **WARNING** Danger of electric shock.

  Improper wiring my cause danger due high voltages when the motor or the drive is enabled.

  – Check the wiring according to:
    - the selected operating mode
    - the installation and wiring notes in chapter "Electrical Installation"
    - the installation and wiring notes in chapter "Electrical Installation" in the "MOVITRAC® LTP-B" operating modes.
- **INFORMATION**

  For further information on the drive adaption, refer to chapter "Control loop optimization for gateway mode" (page 42).

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SEW gateway mode

For operation with direct fieldbus connection (via gateway):

Setting motor limits

For a detailed description of the following parameters, refer to the MOVITRAC® LTP-B operating instructions.

- Set parameter *P1-01* to the upper limit of the required motor speed (N_{max} [rpm]). If the values are displayed in Hz, set the rated speed of the motor in *P1-10* to the rated speed of the connected motor. *P1-01* also displays the possible maximum speed in gateway mode. Scaling: 0x4000 = 100 % of the maximum speed as set in *P-01*. Values above 0x4000 or below 0xC000 are limited to 0x4000 / 0xC000. (For all Smart Servo Package motors, *P1-10* should show 4500 rpm).
- Set *P1-03* to the required acceleration ramp that specifies the time in seconds, the output frequency increases from 0 to 50 Hz (AccRamp [s]). The 6-pole CMP motors of the Smart Servo Package require an output frequency of 150 Hz for a speed of 3000 rpm, for example. You have to set *P1-03* to 0.33 s to specify an acceleration ramp of 3000 rpm/s.
- Set *P1-04* to the required deceleration/stop ramp that specifies the time in seconds, the output frequency decreases from 50 to 0 Hz (DecRamp [s]). See *P1-03* (above) for a scaling example.

Setting the control source

- Set parameter *P1-12* to "5", i.e. control via SBus MOVILINK® and thus via the gateway. For a detailed description of this parameter, refer to the MOVITRAC® LTP-B operating instructions.

Setting the communication parameters

For a detailed description of the following parameters, refer to the MOVITRAC® LTP-B operating instructions.

- Set *P1-14* to "101" for extended parameter access.
- Set the required drive address in *P5-01* (1 – 63).
- Set the required baud rate in *P5-02* (125, 250, 500, 1000 kBaud). For gateway mode, the baud rate must be set to 500 "kBaud".
- Set *P5-05* to the required "Communication failure response".
  - 0 = error and coast to a stop

    1 = error and stop via a ramp

    2 = stop via a ramp, no error

    3 = preset speed 8

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- Set *P5-06* to the required "Communication failure time monitoring" (0.0 – 1.0 – 5.0 s). This determines the time in seconds after which the inverter performs the response set in *P5-05*. With "0.0 s", the inverter maintains the actual speed even if the communication fails.
- Use *P5-07* to specify the use of "external or internal ramps". You can use this parameter to enable internal or external ramp control. With the enable signal, the inverter follows the external ramps that are specified via the MOVILINK® process data (PO3).(0 = Inhibit, 1 = Enable).
- **CAUTION** As the electrical installation depends on the respective operating mode, chapter "Overview of signal terminals for SEW gateways" (page 21) provides wiring information.
- ⚠ **WARNING** Danger of electric shock.

  Improper wiring my cause danger due high voltages when the motor or the drive is enabled.

  – Check the wiring according to:
    - the selected operating mode
    - the installation and wiring notes in chapter "Electrical Installation"
    - the installation and wiring notes in chapter "Electrical Installation" in the "MOVITRAC® LTP-B" operating instructions.
- **INFORMATION**

  For further information on the drive adaption, refer to chapter "Control loop optimization for gateway mode" (page 42).

5.3 Software

5.3.1 Modbus control

Modbus control is not possible when using the LTX module.

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5.4 Control loop optimization in different operating modes

5.4.1 Control loop optimization with third-party controllers

±10 V reference potential and encoder simulation

Setting speed control

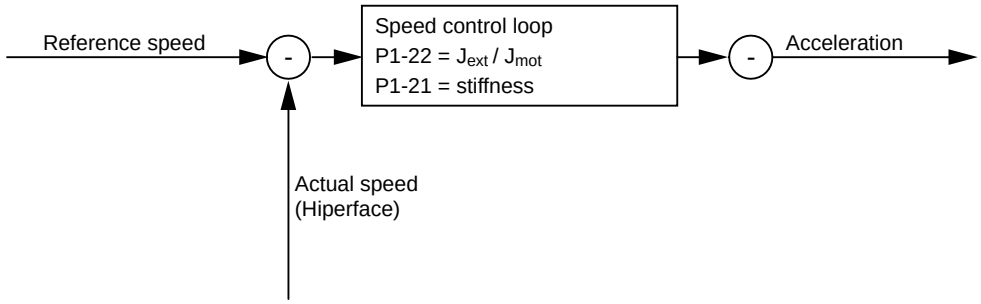
You can use *P1-22* to optimize the control response of the motor. Parameter *P1-22* represents the relation between total inertia ($J_{ext} = J_{Load} + J_{Gear\ unit}$) and motor inertia ($J_{mot} / J_{bmot}$).

$$P1-22 = \frac{J_{ext}}{J_{mot}}$$

- **INFORMATION**

  For further information regarding the motor inertia, refer to chapter "Mass moment of inertia of the CMP motors in the Smart Servo Package" (page 56).

If the control accuracy is not sufficient, you can optimize the stiffness (*P1-21*). The stiffness parameter (*P1-22*) sets an adequate ratio for the speed control parameters (*P4-03*, *P4-04*). Most applications do not require an additional optimization of parameters *P4-03* or *P4-04*.



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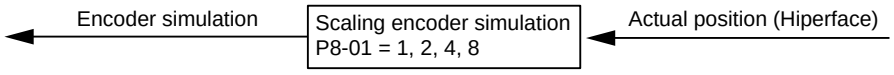

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Interface pulse / direction (A/B phase)

Setting speed control

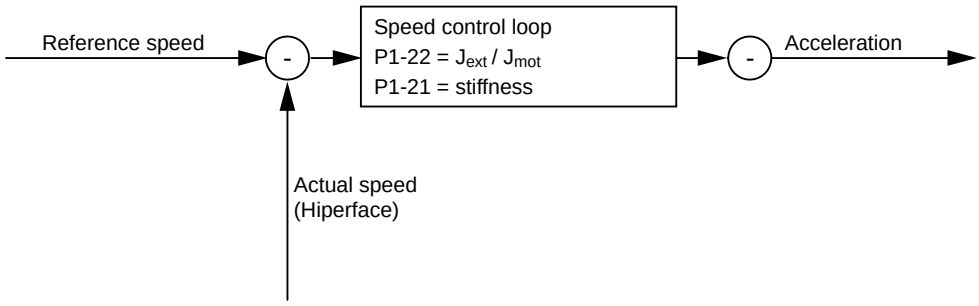
You can use *P1-22* to optimize the control response of the motor. Parameter *P1-22* represents the relation between total inertia (J_{ext} = J_{Load} + $J_{Gear\ unit}$) and motor inertia (J_{mot} / J_{bmot}).

$$P1-22 = \frac{J_{ext}}{J_{mot}}$$

- **INFORMATION**

  For further information regarding the motor inertia, refer to chapter "Mass moment of inertia of the CMP motors in the Smart Servo Package" (page 56).

If the control accuracy is not sufficient, you can optimize the stiffness (*P1-21*). The stiffness parameter (*P1-22*) sets an adequate ratio for the speed control parameters (*P4-03*, *P4-04*). Most applications do not require an additional optimization of parameters *P4-03* or *P4-04*.



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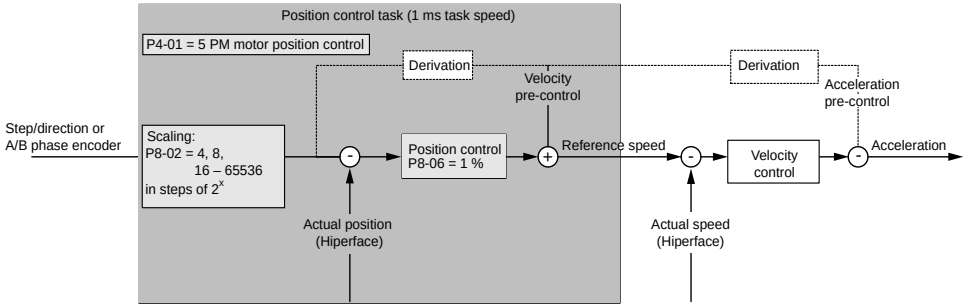
Setting position control

Position control (*P4-01 = 5*) must be activated for pulse/direction and A/B encoder signals.



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5.4.2 Control loop optimization with SEW controllers

Setting the control response

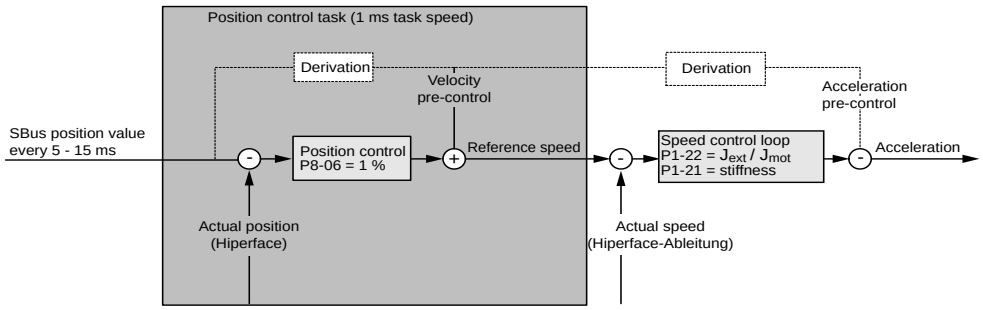
You can use *P1-22* to optimize the control response of the motor. Parameter *P1-22* represents the relation between total inertia (J_{ext} = J_{Load} + $J_{Gear\ unit}$) and motor inertia (J_{mot} / J_{bmot}).

$$P1-22 = \frac{J_{ext}}{J_{mot}}$$

- **INFORMATION**

  For further information regarding the motor inertia, refer to chapter "Mass moment of inertia of the CMP motors in the Smart Servo Package" (page 56).

If the control accuracy is not sufficient, you can optimize the stiffness (*P1-21*). The stiffness parameter (*P1-22*) sets an adequate ratio for the speed control parameters (*P4-03*, *P4-04*). Most applications do not require an additional optimization of parameters *P4-03* or *P4-04*.



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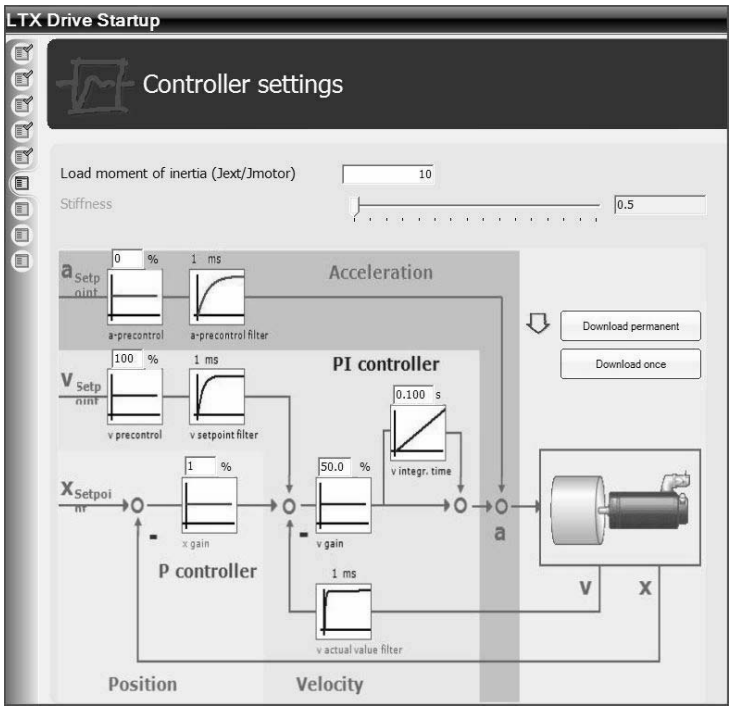
Control response setting with "Drive startup"



5.4.3 Control loop optimization for gateway mode

Setting speed control

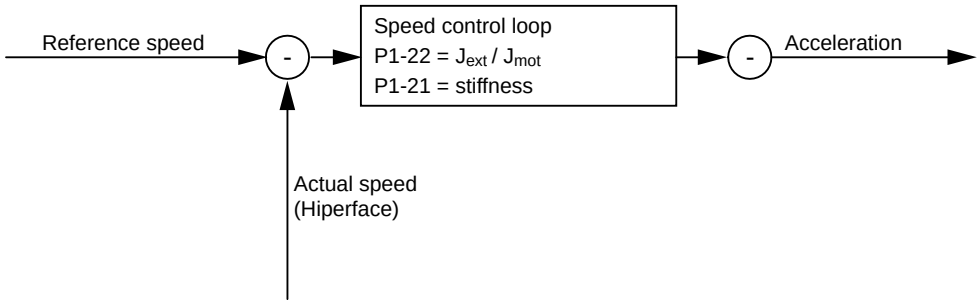
You can use *P1-22* to optimize the control response of the motor. Parameter *P1-22* represents the relation between total inertia (J_{ext} = J_{Load} + $J_{Gear\ unit}$) and motor inertia (J_{mot} / J_{bmot}).

$$P1-22 = \frac{J_{ext}}{J_{mot}}$$

- **INFORMATION**

  For further information regarding the motor inertia, refer to chapter "Mass moment of inertia of the CMP motors in the Smart Servo Package" (page 56).

If the control accuracy is not sufficient, you can optimize the stiffness (*P1-21*). The stiffness parameter (*P1-22*) sets an adequate ratio for the speed control parameters (*P4-03*, *P4-04*). Most applications do not require an additional optimization of parameters *P4-03* or *P4-04*.



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6 Parameters

This chapter describes the LTX parameters. Also observe the parameter description in the operating instructions for MOVITRAC® LTP-B. The parameters described here complement the parameters of MOVITRAC® LTP-B. Further, this chapter describes parameters that change if you use MOVITRAC® LTX. The factory setting is underlined.

6.1 LTX-specific parameters (level 1)

Parameters	Description	Section	Default setting	Explanation
P1-16	Motor type	In-Syn Syn 40M / 40M bP 50S / 50S bP 50M / 50M bP 50L / 50L bP 63S / 63S bP 63M / 63M bP 63L / 63L bP gEArF2[1)] gEArF4[1)]	In-Syn	For motor setting (CMP and MOVIGEAR®). This parameter is set automatically when Hiperface® encoder information is read-in via the LTX encoder card. When using a permanent magnet motor in FI operation, *P1-16* does not have to be changed. In this case *P4-01* determines the motor type (Autotune required).
P1-17	Servo module I/O function selection	0 – 6	1	Determines the function of the servo module I/O. See chapter "P1-17 Smart Servo mode"
P1-18	Motor thermistor selection	0 Disabled 1 KTY	0	Thermal motor protection with KTY enabled.
P1-19	Inverter address	0 – 125	1	Global inverter address setting (Mirror parameter of *P5-01*.)
P1-20	SBus baud rate	125, 250, 500, 1000 kBaud	500 kBd	Expected SBus baud rate setting. (Mirror parameter of *P5-02*.)
P1-21	Stiffness	0	0	Reserved
P1-22	Load inertia	0 – 400	10	Inertia ratio between motor and connected load can be specified in the inverter. This value can usually remain set to the default value 10. However, it is used by the control algorithm as pre-control value for CMP/PM motors in order to provide the optimal torque/ current for the acceleration of the load. This is why the exact setting of the inertia ratio improves the response characteristics and the dynamics of the system. In a closed control loop, the value is calculated as follows: $P1\text{-}22 = \frac{J_{total\ load}}{M0_{Motor}} \times \frac{10^5}{s^2}$ If you do not know the value, keep the default setting "10".

1) Only drives with 400 V

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6.2 P1-14 extended parameter access

Setting range: 0 – 30000

This parameter allows access to the non-standard parameter groups (parameters *P1-01 – P1-15*). Access is possible if the following values are valid.

- 0 / P1-01 – P1-15
- 1 / P1-01 – P1-22
- 101 /P1-01 – P5-08
- 201/ P1-01 – P8-15

6.3 P1-15 binary input function selection, LTX-specific parameters

Setting range: 0 – 1 – 25

P1-15 = 22, 23, 24 and 25 are intended for MOVITRAC® LTX exclusively. We recommend to use them only in conjunction with a third-party PLC. This requires terminal control (*P1-12* = 0).

P1-15	Binary input 1	Binary input 2	Binary input 3	Analog input 1	Analog input 2
1	O: Controller inhibit C: Enable	O: Forward C: Backward	O: Selected speed setpoint C: Preset speed 1, 2	Analog speed ref. 1	O: Preset speed 1 C: Preset speed 2
22	O: Normal mode C: Reference cam	O: Normal mode C: Jog speed +	O: Normal mode C: Jog speed –	Speed setpoint	O: Normal mode C: Reference travel start
23	O: Normal mode C: Reference cam	O: Limit switch + C: Normal mode	O: Limit switch – C: Normal mode	Speed setpoint	O: Normal mode C: Reference travel start
24	O: Controller inhibit C: Enable	O: Normal mode C: Jog speed +	O: Normal mode C: Jog speed –	Speed setpoint	O: Normal mode C: Reference cam
25	O: Controller inhibit C: Enable	O: Limit switch + C: Normal mode	O: Limit switch – C: Normal mode	Speed setpoint	O: Normal mode C: Reference cam

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- If a function set in *P1-15* is also set in *P1-17* (servo module input), the servo module input has priority and the function of *P1-15* is enabled.
- If no enable/controller inhibit input is set in *P1-15* (*P1-15* = 22 or 23), the inhibit input triggers the output stage. If the inhibit signal is removed during operation, the MOVITRAC® LTX drive coasts to a stop.
- When using a gateway, priority is given to the control via SBus MOVILINK® protocol (*P1-12* = 5).
- Reference mode is disabled if no servo module is connected.
- For operation with SEW-EURODRIVE controllers, the inputs are set as follows via the "Drive startup" software:

Digital input profile 1	STO	/Controller inhibit
	DI01	Enable
	DI02	Reset
	DI03	Reference cam
Digital input profile 2	STO	/Controller inhibit
	DI01	Enable
	DI02	Reset
	DI03	Reference cam
	DI04	/Hardware limit switch +
	DI05	/Hardware limit switch –

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6.4 P1-16 motor type

Setting the motor type

Display value	Motor type	Explanation
1 n - 54n	Induction motor	Default setting. Do not change if none of the selection options match. Select the induction motor or the permanent magnet motor via parameter *P4-01*.
54n	Undefined servomotor	Undefined servomotor. You must set special servo parameters during startup. (See section 5.2.1). In this case, you have to set *P4-01* to PM motor control.
40M	CMP40M	Preset CMP motors from SEW-EURODRIVE. Selecting one of those motor types will automatically set all the motor-specific parameters. The overload behavior is set to 200% for 60 s and 250% for 2 s.
40M bP	CMP40M with brake	
50S	CMP50S	
50S bP	CMP50S with brake	
50M	CMP50M	
50M bP	CMP50M with brake	
50L	CMP50L	
50L bP	CMP50L with brake	
63S	CMP63S	
63S bP	CMP63S with brake	
63M	CMP63M	
63M bP	CMP63M with brake	
63L	CMP63L	
63L bP	CMP63L with brake	
9EArF2	MOVIGEAR® size 2	Selection for MOVIGEAR® operation. Select the required size. All the corresponding parameters are set automatically. In this case, the overload is 300% of the nominal current.
9EArF4	MOVIGEAR® size 4	

This parameter is set automatically if the Hiperface® encoder information are read-in via the LTX encoder card and classified as suitable when the LTP-B is switched on. The encoder information is suitable if they represent a motor from the Smart Servo Package.

When using a permanent magnet motor without encoder feedback, *P1-16* does not have to be changed. In this case *P4-01* determines the motor type (Autotune required).

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6.5 P1-17 Smart Servo operation

P1-17 is only used in conjunction with the MOVITRAC® LTX module.

P1-17	Binary input 11	Binary input 12	Binary input 13	Binary input 14 / analog input 11	Pulse input 1		Pulse input 2	
	DI 11	DI12	DI13	DI14 / AI11	PI1	\PI1	PI2	\PI2
1	–	–	O: Normal mode C: Touch probe 1	O: Normal mode C: Touch probe 2	–		–	
2	O: Limit switch + C: Normal mode	O: Limit switch – C: Normal mode	O: Normal mode C: Touch probe 1	O: Normal mode C: Touch probe 2	–		–	
3	–	–	O: Normal mode C: Reference cam	O: Normal mode C: Touch probe 2	–		–	
4	O: Limit switch + C: Normal mode	O: Limit switch – C: Normal mode	O: Normal mode C: Reference cam	O: Normal mode C: Touch probe 2	–		–	
5	–	–	O: Normal mode C: Reference cam	Fast analog input (speed reference)	–		–	
6	O: Limit switch + C: Normal mode	O: Limit switch – C: Normal mode	O: Normal mode C: Reference cam	Fast analog input (speed reference)	–		–	
7	–	–	–	–	Pulse	\Pulse	Direction	\Direction
8	–	–	–	–	A-phase	\A-phase	B-phase	\B-phase

- If a function set in *P1-15* is also set in *P1-17* (servo module input), the servo module input has priority and the function of *P1-15* is enabled.
- When using SEW controllers (*P1-12* = 8) or gateways (*P1-12* = 5), the analog input is disabled.
- The measuring sensor only works in conjunction with an SEW controller.

6.6 P1-21 Stiffness

Setting range: 0.50 – <u>1.00</u> – 2.00

If the control accuracy is insufficient, set *P1-22 load inertia* to the best value. Then you can optimize the accuracy of the load disturbance value in parameter *P1-21 stiffness*.

The stiffness parameter (*P1-21*) sets an adequate ratio for the speed control parameters (*P4-03*, *P4-04*). Most applications do not require an additional optimization of parameters *P4-03* or *P4-04*.

Whenever parameter *P1-22* is set, parameters *P4-03* and *P4-04* are set automatically.

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6.7 P1-22 motor load inertia

Setting range: 0.0 – 1.0 – 30.0

The inertia ratio between motor and connected load can be specified in the inverter. This value can usually remain set to the default value 1.0. However, it is used by the control algorithm as pre-control value for CMP/PM motors in order to provide the optimal torque/ current for the acceleration of the load. This is why the exact setting of the inertia ratio improves the response characteristics and the dynamics of the system. In a closed control loop, the value is calculated as follows:

$$P1-22 = \frac{J_{ext}}{J_{mot}}$$

If you do not know the value, keep the default setting "1.0" (default setting).

- J_{ext} = load inertia + inertia of the gear unit, the couplings, the bevel gears, etc. applied to the motor shaft.
- J_{mot} = motor inertia with or without brake
- **INFORMATION**

  For further information regarding the motor inertia, refer to chapter "Mass moment of inertia of the CMP motors in the Smart Servo Package" (page 56).

6.8 P2-01 preset speed 1

Setting range: –P1-01 – 5.0 Hz – P1-01

Is also used for speed in jog mode + and jog mode –.

6.9 P2-05 preset speed 5

Setting range: –P1-01 – 0.0 Hz – P1-01

Also used for search velocity during reference travel.

6.10 P2-06 preset speed 6

Setting range: –P1-01 – 0.0 Hz – P1-01

Also used for clear velocity during reference travel.

6.11 P2-21 display scaling factor

Setting range: –30000 – 0.000 – 30000

Set P2-21 to a negative value to activate the reversal of the motor direction. The reversal of the motor direction is read-out by and realized in the SEW controller. This is why the SEW controller must be restarted when this parameter has been changed.

A reversal of the motor direction with third-party controllers can be achieved by swapping the setpoint connection and the used incremental encoder simulation.

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6.12 LTX function parameter set (level 3)

6.12.1 P8-01 simulated encoder scaling

Setting range: 1, 2, 4, 8

P8-01 × signal periods of the encoder per motor revolution = output periods per motor revolution

With *P8-01* = 1, the simulated encoder pulses per revolution directly correspond to the encoder system (xx0H = 128 Imp; xx1H = 1024 Imp). For additional information refer to section "Setting speed control" (page 38).

6.12.2 P8-02 pulses per revolution for input pulse/direction A/B phase

Setting range: 4, 8 – 32768, 65536

P8-02 determines the interpretation of the pulses at the LTX module input X14 per motor revolution. Each positive and negative edge of the input signal is processed as an increment. The incoming pulses directly affect the position control. See section "Setting position control" (page 39).

Example:

If *P8-01* is set to "1" and *P8-02* to "256", a 1:1 master/slave position coupling is established via the hardware wiring between the simulation output of the master and the pulse input of the slave drive. The master motor must be equipped with an xK0H encoder. The slave motor may be equipped with a random encoder.

6.12.3 P8-03 / P8-04 trip level for lag error

Setting range: 0, 1, 2 – 65535, 6536 *P8-03* Low Word

Setting range: 0, 1, 2 – 65535, 65536 *P8-04* High Word

P8-02 contains the trip level for a lag error. The lag error is calculated directly upstream of the position controller. Set *P8-03* and *P8-04* to "0" to deactivate lag errors.

For additional information refer to section "Setting position control" (page 39).

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6.12.4 P8-05 reference travel

Setting range: 0, 1, 2 – 6, 7

The aim of reference travel is to reference / match the drive and its position data with the machine design. A reference travel determines the real zero position of the drive. This value is used for specifying the tracks required for positioning.

P8-05 contains the reference travel mode and the set reference position.

P8-05 reference travel	
0	No reference travel; only with enabled drive
1	Zero pulse with negative travel direction
2	Zero pulse with positive travel direction
3	End of the reference cam negative travel direction
4	End of the reference cam positive travel direction
5	No reference travel; only without enabled drive
6	Fixed stop; positive travel direction
7	Fixed stop; negative travel direction

Based on the reference point found during reference travel, the machine zero can be shifted with the reference offset *P8-11* / *P8-12*.

If a hardware limit switch is reached during reference travel and the reference point has not yet been found, the drive turns and continues reference travel in the other direction. For Hiperface® absolute encoders, the status "referenced" is always set and is only reset during reference travel. The status "not referenced" remains if the reference travel is canceled.

When deciding whether to reference to the reference cam or zero pulse, note the following points:

- The zero pulse moves when the motor is replaced.
- The reference cam could become inaccurate as a result of age, wear or switching hysteresis.

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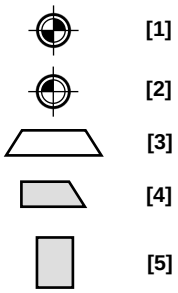
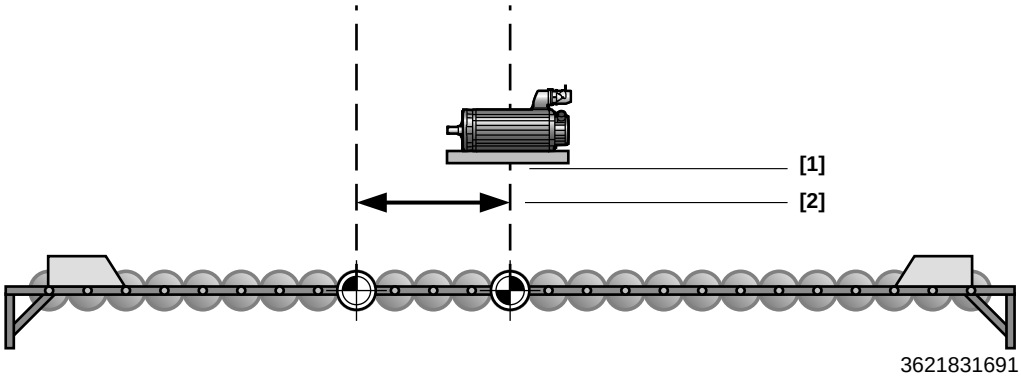
Explanation of symbols used in the "reference travel types" figures



[1] Reference point
[2] Machine zero
[3] Reference cam
[4] Hardware limit switch
[5] Fixed stop

No reference travel; only with enabled drive



[1] Standstill
[2] *P8-11* / *P8-12* reference offset

The reference position is the current position. It makes sense to use this type of reference travel with absolute encoders and for drives that are to be referenced at standstill. For example, the position of an axis can be set to "Zero" if the drive is in the machine zero. The axis can be moved to the reference position manually.

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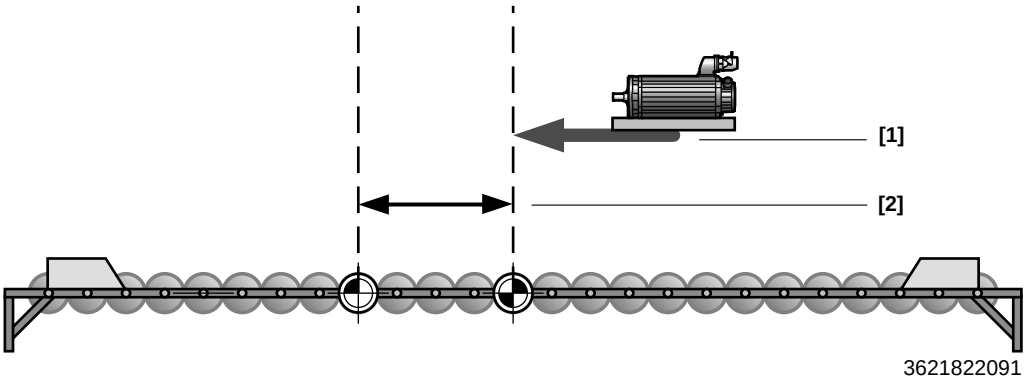
Zero pulse with negative travel direction



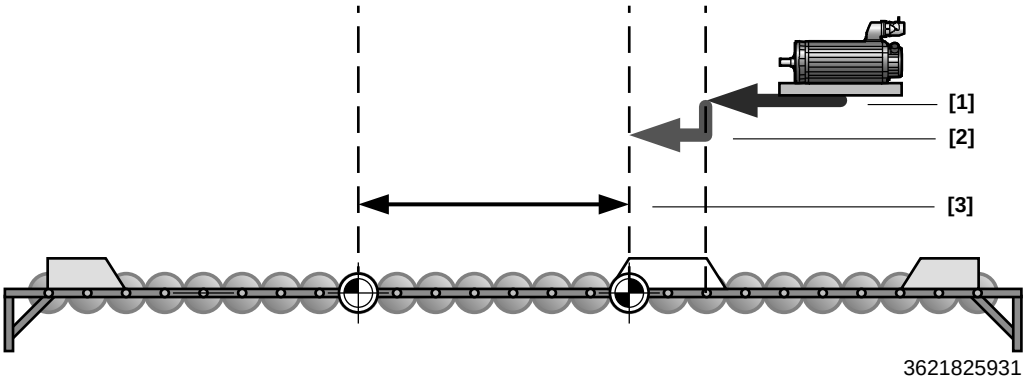
[1] *P2-06* clear velocity
[2] *P8-11* / *P8-12* reference offset

The reference position is the first zero pulse CCW (negative) of the starting position of reference travel. A reference cam is not required. Only *P2-06* clear velocity is used for reference travel.

Zero pulse with positive travel direction

"Zero pulse with positive travel direction" shows the opposite behavior of "Zero pulse with negative travel direction". See "Zero pulse with negative travel direction" (page 52).

End of reference cam negative travel direction



[1] *P2-05* search velocity
[2] *P2-06* clear velocity
[3] *P8-11* / *P8-12* reference offset

The reference position is the negative end of the reference cam.

Set *P1-15* or *P1-17* to input function "Reference cam". Further information can be found in the following chapters:

- *P1-15* binary function selection, LTX-specific parameters (page 44)
- *P1-17* Smart Servo operation (page 47)

Reference travel starts with the search velocity in a negative rotational direction up to the first positive edge of the reference cam. Search velocity changes to clear velocity once the reference cam is detected.

The reference point will then be the falling edge (negative end) of the reference cam.

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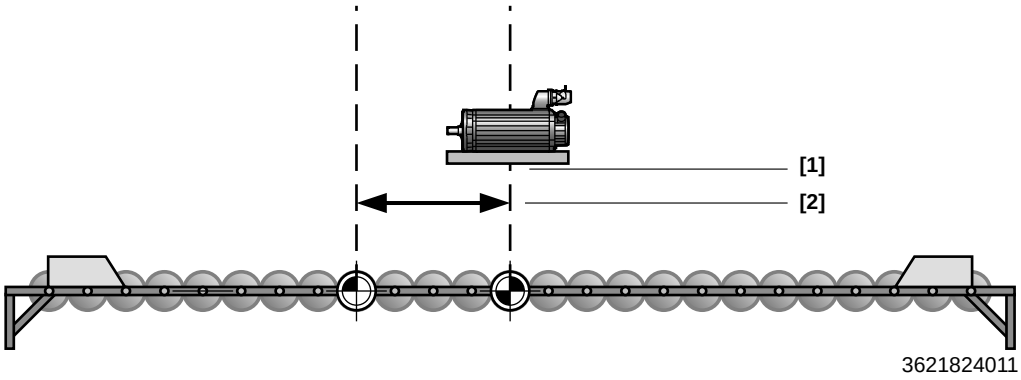
End of reference cam positive travel direction

"End of reference cam positive travel direction" shows the opposite behavior of "End of reference cam negative travel direction". See chapter "End of reference cam negative travel direction" (page 52).

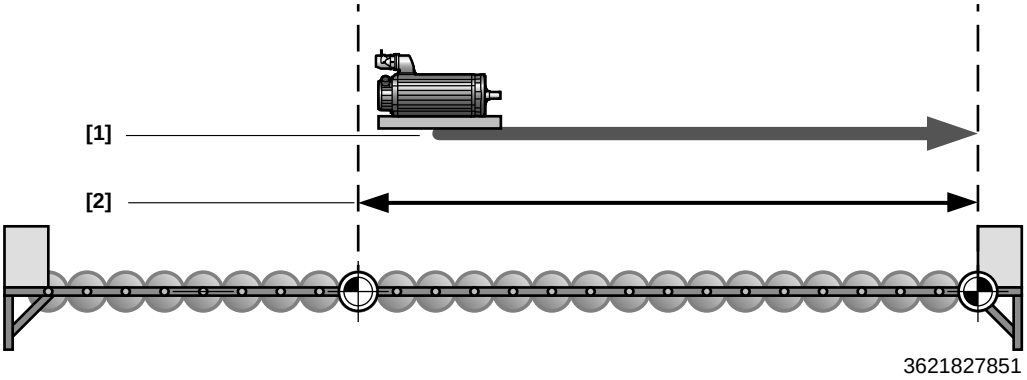
No reference travel; only without enabled drive



[1] Standstill
[2] *P8-11* / *P8-12* reference offset

The reference position is the current position. It makes sense to use this type of reference travel with absolute encoders and for drives that are to be referenced at standstill. For example, the position of an axis can be set to "Zero" if the drive is in the machine zero. The axis can be moved to the reference position manually.

Fixed stop; positive travel direction



[1] *P2-06* clear velocity
[2] *P8-11* / *P8-12* reference offset

The reference position is the positive fixed stop. The machine must be designed so that the fixed stop withstands the impact of the respective velocity without any damage.

Reference travel starts in positive direction. The reference travel starts with clear velocity.

The torque (parameter *P8-14 torque for fixed stop*) is maintained at the fixed stop.

Fixed stop; negative travel direction

"Fixed stop; negative travel direction" shows the opposite behavior of "Fixed stop; positive travel direction". See "Fixed stop; positive travel direction" (page 53).

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6.12.5 P8-06 position controller proportional gain

Setting range: 0.1 – 1 – 400 %

Setting the proportional gain of the position controller. Higher values cause higher positioning accuracy. If the value is too high, it can cause instability or even overcurrent errors. For applications that require the best possible control, you can adapt the value to the connected load by gradually increasing the value and observing the actual speed of the load. Continue this process as long as you have achieved the required dynamics without or with only slightly exceeding the control range, i.e. the setpoint value of the output speed.

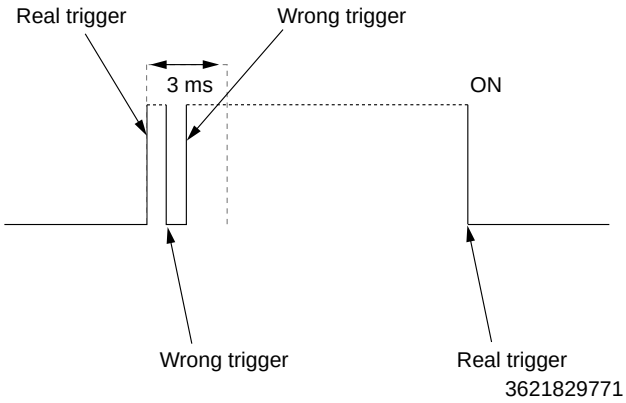
For additional information refer to section "Setting position control" (page 39).

6.12.6 P8-07 measuring sensor edge

P8-07	Touch probe 1	Touch probe 2
0	Positive edge	Positive edge
1	Negative edge	Positive edge
2	Negative edge	Negative edge
3	Positive edge	Negative edge

P8-07 defines the trip device for both measuring sensors at connection X14.

Filter for bouncing switches:



Once a measuring sensor has been tripped with a positive edge, this input is blocked for 3 ms. There is no filter for tripping a measuring sensor with a negative edge. Bouncing measuring sensors should work in positive direction.

With fast initiators, you can achieve an accuracy of 1 ms for the measuring sensor position.

For example: With a process speed of 1 m/s you can reach an accuracy of 1 mm for the measuring sensor position.

The measuring sensor function can only be used by SEW controllers.

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6.12.7 P8-09 velocity precontrol gain

Setting range: 0.0 - 100 - 400%

This parameter amplifies the derivation of the position setpoint. You should not change the default setting. Only if the derived position setpoints do not provide for a smooth signal, you should reduce this value. This can reduce the humming of the motor.

For more information, refer to chapter "Control setting with Drive startup" (page 41).

6.12.8 P8-09 acceleration precontrol gain

Setting range: 0.0 - 100 - 400%

You should not change the default setting. This parameter amplifies the derivation of the acceleration precontrol.

For very fast positioning tasks (< 100 ms) with the positioning quality of SEW controllers it may make sense to increase this value in order to reduce the position lag error within a ramp.

For more information, refer to chapter "Control setting with drive startup" (page 41).

6.12.9 P8-11, P8-12 reference offset position

Setting range: 0, 1, 2 – 65535, 65536 [increments] *P8-11 Low Word*; 2^{16} = 1 revolution

Setting range: 0, 1, 2 – 65535, 65536 [revolutions] *P8-12 High Word*

Parameters *P8-11* and *P8-12* provide the reference offset that is set to the actual position at the end of reference travel. For more information, refer to chapter *"P8-05* reference travel" (page 50).

6.12.10 P8-14 torque for fixed stop

Setting range: 0.1 – 100 – 400% [*P1-08*]

The torque current for a reference travel to a fixed stop is *P8-14* × *P1-08*. For more information, refer to chapter *"P8-05* reference travel" (page 50).

6.12.11 P8-15 speed and position controller auto-tune

In preparation.

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7 Technical Data and Dimension Sheets

7.1 Environment

Ambient temperature	–10 to 50 °C
Degree of protection of the standard housing	IP20

7.2 Technical data X14 application connection

Binary input 11 – binary input 14 (DI11, DI12, DI13, DI14)	DC 24 V nominal value DC 11 – 30 V for Logic 1 DC 30 V max. input
Analog input 11 (AI11)	DC –10 to 10 V, max. input DC 30 V, 12 bit signed, response time < 2 ms
Pulse input 1 – pulse input 2 (PI1, /PI1, PI2, /PI2)	Maximum frequency 200 kHz Input is RS422-compliant and not HTL-capable (connection of 24 V signals not possible). Maximum voltage from –10 to 15 V between PI1, /PI1, PI2, /PI2 and 0 V Nominal operating level of DC ± 6 V differential and minimum DC ± 2 V differential
Encoder simulation outputs (A, /A, B, /B, Z, /Z)	Output max. 5 V

7.3 Mass moment of inertia values for CMP motors in the Smart Servo Package

The mass moment of inertia of the respective motor is required to be able to set *P1-22 motor load inertia* correctly. The following two tables list the mass moment of inertia values for CMP40, 50 and 63 with and without brake.

7.3.1 CMP servomotors, speed class 4500 rpm

Type	J_{mot} x 10^{-4} kgm^2
CMP40M / KY / AK0H / SM1	0.15
CMP50S / KY / AK0H / SM1	0.42
CMP50M / KY / AK0H / SM1	0.67
CMP50L / KY / AK0H / SM1	0.92
CMP63S / KY / AK0H / SM1	1.15
CMP63M / KY / AK0H / SM1	1.92
CMP63L / KY / AK0H / SM1	2.69

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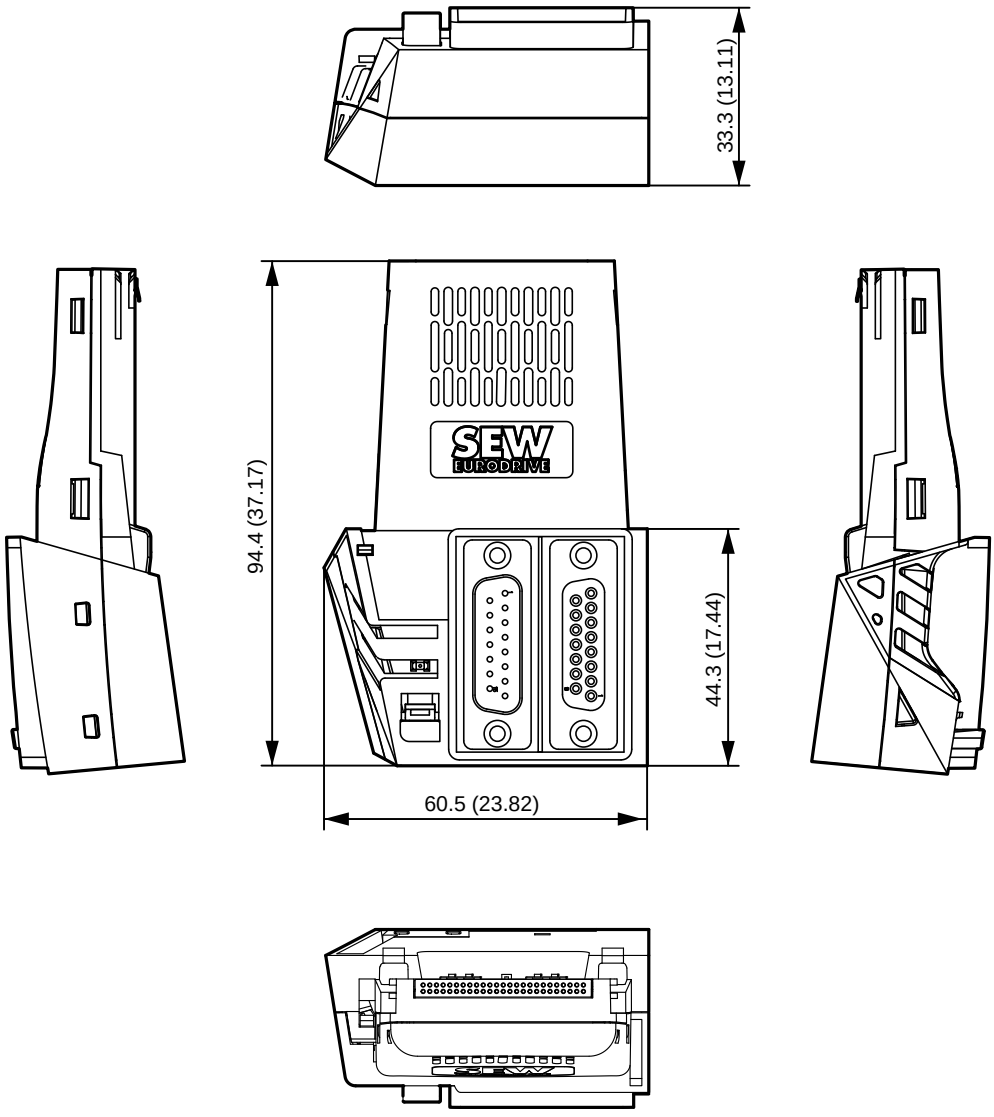
7.3.2 CMP servomotors with brake, speed class 4500 rpm

Type	J_{mot} x 10^{-4} kgm^2
CMP40M / KY / AK0H / SB1	0.18
CMP50S / KY / AK0H / SB1	0.48
CMP50M / KY / AK0H / SB1	0.73
CMP50L / KY / AK0H / SB1	0.98
CMP63S / KY / AK0H / SB1	1.49
CMP63M / KY / AK0H / SB1	2.26
CMP63L / KY / AK0H / SB1	3.03

7.4 MOVITRAC® LTX dimension drawing

The following dimension drawing shows the MOVITRAC® LTX. The dimensions are specified in mm (in).



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